PARANDRA ARAUCARIAE GRESSITT (COLEOPTERA: CERAMBYCIDAE: PARANDRINAE): A NEW RECORD FOR NORFOLK ISLAND

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Parandra araucariae Gressitt is recorded from Norfolk Island for the first time. *Araucaria heterophylla* (Salisb.) Franco is confirmed as a larval host of *P. araucariae*. The current distribution of the genus *Parandra* in the Australasian region is related to the distribution of the plant genus *Araucaria* and to the palaeogeography of the region. □ *Coleoptera, Cerambycidae, Parandra, Norfolk Island, new record.*

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Parandra frenchi Blackburn is the only species of *Parandra* described from Australia and its territorial islands. Several species are present in New Guinea, and adjoining islands and in the island groups of Fiji and New Caledonia (Arigony, 1984; Bigger & Schofield, 1983). In the early 1970's the collections of both the Forestry Commission of New South Wales in Sydney (FCNI) and the Australian National Insect Collection in Canberra (ANIC) acquired female specimens of a small *Parandra* from Norfolk Island, 1200km east of Brisbane. These have now been identified as females of *Parandra araucariae* Gressitt, a species formerly only known from New Guinea and Normanby Is., off the south-east coast of New Guinea (Bigger & Schofield, 1983; Gressitt, 1959).

OBSERVATIONS

MATERIAL EXAMINED

Norfolk Island: Taylors Rd, 1 Feb 1973, K. Clarke, ex. Norfolk Island Pine sawn timber, 3F, FCNI; Dec 1984, M. Jowett, F, ANIC; Mar 1971, 'Donated by residents of the island', F, ANIC; Botanic Garden, May 1984, L. Hill, ANPWS, F, ANIC; R. Paton, 7 Feb 1980, in Araucaria log, F, ANIC; R. Paton, 7 Feb 1980, in fungus, F, ANIC; R. Paton, 5 Feb 1980, at light, F, ANIC.

New Guinea: NE, Wum, Upper Jimmi Valley, 840m, J.L. Gressitt, 16 Jul 1955, 1M - paratype, ANIC; Wau, H. Ohlmus, Dec 1974, 1M, 1F, ANIC; Northern District, Bulolo, c. 638m, B.B. Lowery, 15 Jul 1970 to 4 Jan 1971, at light, 2F, ANIC.

REMARKS

Nine specimens (all females) from Norfolk Island and five from New Guinea (2 males and 3 females) were available for study. Female *P. araucariae* appear to be highly variable in size ranging in body length from 8.7 to 17.5mm and maximum width (2.5 to 5.6mm) (Table 1 and Gressitt 1959). Specimens examined from Norfolk Island fall within the lower end of both of these ranges and are generally smaller using other criteria (Table 1). All specimens fit the original description in other respects.

DISCUSSION

HOST ASSOCIATION

Gressitt (1959) recorded the male and female type specimens 'on felled *Araucaria*' and other female material 'on *Araucaria*'. Gressitt gave no indication whether these specimens were reared from *Araucaria* timber or just found on timber. Gressitt and Hornabrook (1977) noted that 'The genus *Parandra* is associated with *Araucaria* trees in New Guinea'. Four specimens of *P. araucariae* collected from Norfolk Island were actually collected in *Araucaria heterophylla* (Salisb.) Franco timber or reared from stored timber, confirming the genus *Araucaria* as hosts of *P. araucariae*. One specimen was recorded 'in [unknown] fungus' but it is not clear whether this specimen was feeding on or in the fungus or whether it was in the decayed timber associated with a saprophytic fungus on *A. heterophylla*.

The locations provided by Gressitt (1959) and given for specimens in the ANIC from New Guinea fit within the distribution of both *A. cunninghamii* D. Don and *A. hunsteinii* K. Schum., the two species of *Araucaria* present in New Guinea (Enright, 1982). It is therefore not possible to determine which species of *Araucaria* was the host.

TABLE 1. Morphological characteristics of *P. araucariae* from Norfolk Island and New Guinea.

CHARACTER	Mean and Range (mm)		
	Norfolk Island (n = 9F)	New Guinea (n = 3F)	New Guinea (n = 2M)
Body length	12.2 (8.7-17.1)	14.1 (13.0-15.2)	14.6 (13.6-15.6)
Elytron length	7.9 (5.4-10.3)	8.7 (8.2-9.6)	8.4 (8.0-8.8)
Elytron width at base	3.4 (2.5-4.6)	4.0 (3.6-4.4)	4.1 (3.8-4.4)
Head width (to edge of eye)	2.9 (2.2-3.6)	3.1 (2.8-3.5)	3.8 (3.6-4.0)
Pronotum length	2.7 (2.0-3.6)	2.9 (2.7-3.3)	3.4 (3.1-3.6)
Pronotum width	3.4 (2.5-4.3)	3.9 (3.7-4.2)	4.3 (4.0-4.6)
Antenna length	3.0 (2.5-3.8)	3.3 (3.2-3.5)	3.7 (3.6-3.8)
Antenna/body ratio	0.24 (0.24-0.29)	0.24 (0.23-0.25)	0.25 (0.24-0.26)
Head width/body length ratio	0.23 (0.21-0.30)	0.22 (0.21-0.23)	0.26 (0.26-0.26)
Pronotum width/pronotum length ratio	1.29 (1.25-1.36)	1.33 (1.27-1.37)	1.29 (1.28-1.29)
Elytra width/elytra length ratio	0.43 (0.35-0.47)	0.46 (0.44-0.48)	0.49 (0.48-0.50)

Species of *Parandra* have been recorded from a range of plant hosts (Duffy, 1960, 1963; Gressitt 1959). To my knowledge, four species have been recorded from *Araucaria* hosts (Table 2).

PALAEOGEOGRAPHIC DISTRIBUTION OF *ARAUCARIA* AND *PARANDRA*

The palaeogeography of Gondwanaland is of considerable significance in interpreting the present day distribution of *Araucaria* and *Parandra*. Both genera are distributed largely on the southern blocks which once formed Gondwanaland (Africa, South America, and the Australasian region). *Araucaria* has a limited distribution in the southern hemisphere occuring in Australia (including Norfolk Is.), Papua New Guinea, New Caledonia, New Hebrides and in South America (Ntima, 1968). To a limited extent, *Parandra* has spread beyond these limits into central and North America from South America, and into South-east Asia from the Australian region via New Guinea. *Parandra* also occurs on the African continent, where *Araucaria* is now absent.

The first *Araucaria* fossils appeared in the lower Jurassic (180-160mya) of southern India, New Guinea, eastern Australia, New Zealand and Antarctica (Ntima, 1968). The genus survived on the Indian and New Zealand blocks until the end of the Mesozoic (135-125mya) (Crook, 1981; Powell et al., 1981), about the time when India separated from Gondwanaland. The New Zealand block (containing New Zealand, New Caledonia, Fiji, Lord Howe Island and Norfolk Island) separated from continental Australia in the late Cretaceous (c. 80-60mya) but maintained a tenuous land bridge through the northern end of the Lord Howe Rise (off Queensland). Species of *Araucaria* and *Parandra* persist on all of these islands/island groups except New Zealand and Lord Howe Island.

Final separation of Australia (and its leading edge which now forms part of New Guinea) from Antarctica occurred in the Oligocene (c. 35mya). South America remained connected to Antarctica till the early Tertiary (c. 60mya) (Barlow, 1981) but Raven (1979) considered that final separation may have occurred as late as the Oligocene (c. 38-27mya), around the time Australia finally separated from Antarctica. Nevertheless, both continents remained connected via Antarctica until well after the first fossil evidence of *Araucaria*.

Thus, the presence of *Araucaria* in the Australasian region and in distant South America can be explained by the relatively late separation of both blocks from Antarctica. Similarly, within

TABLE 2. Araucarian hosts of *Parandra* spp.

Parandra spp.	Distribution	Host (and reference)
P. araucariae Gressitt	New Guinea, Norfolk Island	*A. cunninghami* D. Don or *A. hunsteinii* Schum. (Gressitt, 1959), *A. heterphylla* (Salib.) Franco (this study)
P. frenchi Blackburn	Eastern Australia	*A. cunninghamii* D. Don (Illidge, 1924)
P. araucana Bosq.	South America	*A. araucana* (Mol.) K. Koch (Duffy, 1960)
P. glabra (Degeer)	South America	*A. angustifolius* (Bertol.) Kuntze (as *brasiliensis*) (Duffy, 1960)

the Australasian region connections between Antarctica and the present day locations of *Araucaria* (Australia, New Guinea, Norfolk Island, New Caledonia, Vanuatu) remained until well after the period of first emergence of *Araucaria*.

DISTRIBUTION AND RELATIONSHIPS

Parandra is currently known from the Australasian region, South-east Asia, South and North America, and Africa. Eight species of *Parandra* (all from the subgenus *Parandra*) are known from the Australasian region and south-east Asia (Arigony, 1984). Based on detailed study of the morphology of these species, Arigony designated three groups within the subgenus *Parandra*. Group 1 contained *P. frenchi* Blackburn (Australia) and *P. araucariae* Gressitt (New Guinea, Normanby Is. and now Norfolk Is.) while Group 3 contained: *P. passandroides* Thomson (New Caledonia), *P. austrocaledonica* Montrouzier (New Caledonia), *P. heterostyla* Lameere (Celebes), *P. solomonensis* Arigony (Solomon Islands) and *P. janus* Bates (New Guinea northward). The position of *P. striatifrons* Fairemaire (Fiji) was not discussed but it probably fits within group 3. Group 2 contains South American and African species and will not be considered further.

P. araucariae is known from New Guinea and from Normanby Island immediately southeast of the mainland of New Guinea (Arigony, 1984; Bigger & Schofield, 1983; Gressitt, 1959). Norfolk Island is c. 2700km SE of the previously known distribution for *P. araucariae* and is closer to Australia (c. 1200km), Fiji (c. 1600km) and New Caledonia (ca. 700km) than to New Guinea. Two species of *Parandra*, *P. austrocaledonica* and *P. passandroides*, are known from New Caledonia and one species, *P. striatifrons*, from Fiji.

Curiously, no *Parandra* were identified from the entomological collections from Norfolk Island detailed by Olliff (1888) and Hawkins (1942). This lack of previous evidence of its presence on Norfolk Island, the geographical distance from its previously known distribution and the absence of *P. araucariae* and other group 1 *Parandra (Parandra)* (sensu Arigony, 1984) from other islands of the New Zealand block invites some suspicion about its status on Norfolk Island. *P. araucariae* may have been accidentally introduced to Norfolk Island in timber (although there is no clear evidence of this). Alternatively, it may represent a relict population of *P. araucariae* which may have been more widespread in the past (although there is no fossil evidence to support this either) or it may represent a new species closely allied to *P. araucariae*. Further study on a larger sample (including males) is required.

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